



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.: 10/614,255 Confirmation No.: 6006
Applicant: Mary Wilkes Eubanks
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Art Unit: 1638
Examiner: Keith O Neal Robinson
Title: METHOD AND MATERIALS FOR INTROGRESSION OF
NOVEL GENETIC VARIATION IN MAIZE
Cust. No.: 00826

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APPEAL BRIEF UNDER 37 CFR § 41.37

This Appeal Brief is being filed pursuant to a "Notice of Appeal to the Board of Patent Appeals and Interferences" filed January [[Day]], 2009. In accordance to MPEP § 1204.01, no fee is believed due because a fee was paid on May 26, 2007, and because no final Board decision was made on the Appeal Briefs filed May 26, 2007, and August 19, 2008.

1. Real Party in Interest.

The real party in interest is Mary Wilkes Eubanks, the inventor and applicant of the above-identified patent application.

2. Statement of Related Cases.

This application is a continuation-in-part of US Patent Application No. 09/368,869, filed August 5, 1999, now US Patent No. 6,617,492, issued September 9, 2003), which claims priority from US Provisional Patent Application No. 60/095,400, filed August 5, 1998.

There are no pending appeals, continuing applications or interferences involving this application or its subject matter. Applicant, however, previously filed Notices of Appeal on March 29, 2007, and June 28, 2008, and previously filed Appeal Briefs on May 26, 2007, and August 19, 2008. Prosecution was re-opened in both instances.

3. Jurisdictional Statement.

The Board has jurisdiction over this appeal under 35 U.S.C. § 134(a), as well as under 37 C.F.R. § 41.37(a)(1). This appeal is taken from a final Office Action dated November 14, 2008, which set a three-month shortened statutory period for reply. The period to reply expires February 16, 2009 (as February 14, 2009, is a Saturday).

The Notice of Appeal is being filed with this brief on January **[[Day]]**, 2009. The time period for filing this Appeal Brief is two (2) months after the filing of the

Notice of Appeal. Because this Appeal Brief is being filed on January **[[Day]]**, 2009, no extension of time is required.

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6. [Reserved]

7. Status of Amendments.

No amendments were filed after issuance of the final Office Action dated November 14, 2008.

8. Grounds of Rejection to be Reviewed.

This appeal seeks review of the following two (2) rejections in the final Office Action dated November 14, 2008:

a. Rejection of Claims 44-70 as obvious under 35 U.S.C. § 103 over US Patent No. 5,330,547 in view of Eubanks M, "Molecular analysis of crosses between *Tripsacum dactyloides* and *Zea diploperennis* (Poaceae)," Theor. Appl. Genet. 94:707-712 (1997).

b. Rejection of Claims 44-70 as obvious under 35 U.S.C. §103 over US Patent No. PP7,977 in view of Eubanks, *supra*.

9. Statement of Facts.

The claimed invention is summarized as a hybrid plant derived by backcrossing a trigeneric plant (*i.e.*, maize X (*Tripsacum*-teosinte); maize X (teosinte-*Tripsacum*); (*Tripsacum*-teosinte) X maize; or (teosinte-*Tripsacum*) X maize) to a maize, (*Tripsacum* X teosinte) or (teosinte X *Tripsacum*) plant, such that the resulting hybrid plant has one or more of the recited restriction fragments {pending Claims 44, 53 and 62}.

Maize is a domestic *Zea* species that has 10 chromosomes {p. 5, line 18, of US Patent App. No. 10/614,255}. Teosinte, such as *Zea diploperennis*, is a wild grass that is in the same genus as maize and that has 10 chromosomes {p. 5, lines 16-19, of *id.*}. *Tripsacum*, such as *Tripsacum dactyloides*, is also a wild grass that is a more distant relative of maize and that has 18 chromosomes {p. 5, lines 29-31, of *id.*}. Because *Tripsacum* is a wild grass, it has valuable agronomic traits that

could be used to improve maize {p. 5, lines 35-36, of *id.*}. Unfortunately, (maize X *Tripsacum*) hybrids are sterile {p. 5, lines 34-35, of *id.*}. Such sterility being attributed to the differences in chromosome numbers between maize and *Tripsacum* {p. 6, lines 3-4, of *id.*}. That is, maize is diploid, which means that it has two homologous copies of each chromosome, one from the female parent plant and the other from the male parent plant {p. 707, second to last paragraph of Eubanks}. *Tripsacum*, on the other hand, can be polyploid, which means that it can be diploid to hexaploid {p. 707, last paragraph of *id.*}.

In the final Office Action dated November 14, 2008, the Examiner indicated that Claims 23 and 44-70 were pending, but that Claims 44-70 were rejected {Office Action Summary of 11/14/2008 Office Action}. Although not subject to an objection or rejection, the Examiner did not indicate the status of Claim 23.

The Examiner maintained the rejection of Claims 44-70 as obvious over US Patent No. 5,330,547 (the '547 patent) in view of Eubanks, *supra* {p. 4, first full paragraph of *id.*}. The Examiner alleged that the '547 patent teaches creating a trigeneric plant {Column 3, line 64, to Column 4, line 2, of '547 patent} and then backcrossing the trigeneric plant to a parental plant {Column 2, lines 30-34, of *id.*} {p. 4 of 11/14/2008 Office Action, referencing pp. 5-7 of 04/28/2008 Office Action}. The Examiner further alleged that even though the '547 patent did not teach screening a maize plant for the presence of one of more restriction fragments,

one of ordinary skill in the art would have found it obvious to do so after reading Eubanks {p. 4 of 11/14/2008 Office Action, referencing pp. 5-7 of 04/28/2008 Office Action}.

The '547 patent describes a method of introducing *Tripsacum* genes into maize {Abstract of '547 patent} by crossing maize with a hybrid plant called Tripsacorn {Abstract and Column 7, lines 14-23, of *id.*}. Tripsacorn is a cross between a *Tripsacum dactyloides* female plant and *Zea diploperennis* male plant {Column 6, line 65, to Column 7, line 6, of *id.*}. The plant produced by crossing maize with Tripsacorn is trigeneric because it has contributions from three different genotypes/germplasm backgrounds. The '547 patent describes backcrossing a (maize X *Tripsacum*) hybrid to maize {Column 2, lines 30-34, of *id.*}. It does not describe backcrossing a (maize X Tripsacorn) or (Tripsacorn X maize) trigeneric plant to either maize or Tripsacorn. A (maize X *Tripsacum*) hybrid is not a trigeneric plant because it has genetic contributions from only two different genotypes/germplasm backgrounds.

The applicant/inventor of the '547 patent and applicant/inventor of the present application are the same individual.

Eubanks describes a molecular analysis, including restriction length fragment polymorphism (RFLP) analysis, of *Tripsacum*, *Z. diploperennis*, Sun Dance (a hybrid of a cross between a teosinte female plant and *Tripsacum* male

plant {Column 1, lines 21-23, of US Patent No. PP7,977}), *Tripsacorn* (a hybrid of a *Tripsacum* female plant and teosinte male plant {Column 1, lines 23-25 of *id.*}) and a F₂ of *Tripsacorn* {Abstract and Materials & Methods of Eubanks}. Eubanks does not describe trigeneric plants such as (maize X *Tripsacorn*) or (*Tripsacorn* X maize) or backcrosses to the parents thereof.

The author of Eubanks and the applicant/inventor of the present application are the same individual.

The Examiner also maintained the rejection of Claims 44-70 as obvious over US Patent No. PP7,977 (the '977 patent) in view of Eubanks, *supra* {p. 7 of 11/14/2008 Office Action}. While the stated rejection is to Claims 40-70, Appellant believes this to be an error as Claims 41-43 were canceled in a response dated 11/13/2007. In addition, the previous rejection was to Claims 44-70 {p. 7 of 04/28/2008 Office Action}. Regardless, the Examiner alleged that the '977 patent teaches a hybrid plant by crossing teosinte and *Tripsacum*, which is then crossed with maize {Abstract and Column 2, lines 14-21, of '977 patent}. The Examiner also alleged that one of ordinary skill in the art would understand that the '977 patent teaches backcrossing, that backcrossing introgresses genes of interest into maize plants, and that trigeneric plants can be backcrossed with maize {pp. 7-8 of 11/14/2008 Office Action}.

The '977 patent describes a hybrid plant named Tripsacorn {Title of '977 patent}. As noted above, Tripsacorn is a cross between a *Tripsacum dactyloides* female plant and *Zea diploperennis* male plant {Column 1, lines 23-25, and Column 3, lines 50-58, of *id.*}. The '977 patent describes Tripsacorn as cross-compatible with maize {Abstract of *id.*} and as a reciprocal cross of Sun Dance, which was described in US Patent No. 6,906 {Column 1, lines 21-23, of *id.*}. While the '977 patent describes trigeneric plants, such as a (maize X Tripsacorn) plant {Column 2, lines 9-21, of *id.*}, it does not describe backcrossing a (maize X Tripsacorn) or (Tripsacorn X maize) plant to either maize or Tripsacorn.

The applicant/inventor of the '977 patent and applicant/inventor of the present application are the same individual.

Eubanks is summarized above.

The level of skill in the art is high and includes one of ordinary skill having a graduate education (*i.e.*, a Ph.D. and subsequent training). **[[Please feel free to amend the level of skill as you see fit. It seems to us that one of ordinary skill in the art, such as you, should have a Ph.D., is this correct?]]**

The rejected claims can be grouped into three (3) claim sets**[[, which stand or fall together?]]**. The first claim set includes Claims 44-52. Claim 44 recites a maize plant having one or more restriction fragments selected from the group in Tables 2 and 3 of the Specification {pp. 35-48 of US Patent App. No. 10/614,255}.

The claimed maize plant is produced by first crossing a maize female plant with either a (*Tripsacum* X teosinte) male plant or (teosinte X *Tripsacum*) male plant {p. 13, lines 16-23, of *id.*}. The claimed maize plant therefore includes genetic contributions from gamagrass (*Tripsacum* *sp.*), teosinte (wild *Zea* *sp.*) and maize (*Zea mays* L. *ssp. mays*). Such a plant is trigeneric. The trigeneric plant is then backcrossed at least once to a maize plant {p. 14, lines 8-13, of *id.*}. A more detailed description on crossing plants is located on pp. 30-31 of US Patent App. No. 10/614,255.

The citations do not describe the claimed backcrossed plant or its restriction fragments.

Claims 45-52 relate to Claim 44. Claim 45 recites products derived from the maize plant of Claim 44, including seed, pollen, subsequent generations, variants, mutants, modification and cellular components {p. 14, lines 13-18, of *id.*}. Claim 46 recites a maize plant of Claim 44 having roots with aerenchyma {p. 14, line 28; p.24, lines 3-4; p. 24, lines 17-22; p. 26, line 27, to p. 29, line 4; p. 29, line 36, to p. 30, line 3, of *id.*}. Claim 47 recites a maize plant of Claim 44 having drought tolerance {p. 14, line 24, and p. 24, lines 1-2, of *id.*}. Claim 48 recites a maize plant of Claim 44 having tolerance to corn rootworm {p. 14, line 23; p. 24, line 1; p. 24, line 23, to p. 25, line 31; and p. 29, lines 31-35, of *id.*}. Claim 49 recites a maize plant of Claim 44 having a novel band identified by simple sequence repeat

polymorphism (SSR) probe phi123 {p. 26, lines 19-23, and p. 29, line 35, of *id.*}.

Claim 50 recites a maize plant of Claim 44 having a novel band identified by SSR probe bnlg2235 {p. 26, lines 19-23, and p. 29, line 4 and 35, of *id.*}. Claim 51 recites a maize plant of Claim 44 having a novel band identified by SSR probe dupSSR23 {p. 26, lines 19-23, and p. 29, line 35, of *id.*}. Claim 52 recites a maize plant of Claim 44 having a novel band identified by SSR probe bnlg1805 {p. 29, line 4, and p. 30, line 3, of *id.*}.

The second claim set includes Claims 53-61. Claim 53 recites a maize plant having one or more restriction fragments selected from the group described in Tables 2 and 3 of the Specification {pp. 35-48 of *id.*}. The maize plant is produced by cross pollinating a (*Tripsacum* X teosinte) female plant or (teosinte X *Tripsacum*) female plant with a maize male plant {p. 13, lines 16-23, of *id.*}. The claimed maize plant therefore includes genetic contributions from gamagrass (*Tripsacum sp.*), teosinte (wild *Zea sp.*) and maize (*Zea mays* L. *ssp. mays*). Such a plant is trigeneric. The trigeneric plant is then backcrossed at least once to a maize plant {p. 14, lines 8-13, of *id.*}. A more detailed description of the crosses is located on pp. 30-31 of US Patent App. No. 10/614,255.

The citations do not describe the claimed backcrossed plant or its restriction fragments.

The maize plants of Claim 53 differ from the maize plants of Claim 44 by virtue of the sex of the parental lines that are initially crossed. That is, in Claim 44, the male plant is a (*Tripsacum* X teosinte) male plant or (teosinte X *Tripsacum*) male plant; whereas in Claim 53, the male plant is a maize plant. Likewise, in Claim 44 the female plant is a maize plant; whereas in Claim 53 the female plant is a (*Tripsacum* X teosinte) female plant or (teosinte X *Tripsacum*) female plant.

Claims 54-61 relate to Claim 53. Claim 54 recites products derived from the maize plant of Claim 53, including seed, pollen, subsequent generations, variants, mutants, modification and cellular components {p. 14, lines 13-18, of *id.*}. Claim 55 recites a maize plant of Claim 53 having roots with aerenchyma {p. 14, line 28; p.24, lines 3-4; p. 24, lines 17-22; p. 26, line 27, to p. 29, line 4; and p. 29, line 36, to p. 30, line 3, of *id.*}. Claim 56 recites a maize plant of Claim 53 having drought tolerance {p. 14, line 24, and p. 24, lines 1-2, of *id.*}. Claim 57 recites a maize plant of Claim 53 having tolerance to corn rootworm {p. 14, line 23; p. 24, line 1; p. 24, line 23, to p. 25, line 31; and p. 29, lines 31-35, of *id.*}. Claim 58 recites a maize plant of Claim 53 having a novel band identified by simple sequence repeat polymorphism (SSR) probe phi123 {p. 26, lines 19-23, and p. 29, line 35, of *id.*}. Claim 59 recites a maize plant of Claim 53 having a novel band identified by SSR probe bnlg2235 {p. 26, lines 19-23, and p. 29, lines 4 and 35, of *id.*}. Claim 60 recites a maize plant of Claim 53 having a novel band identified by SSR probe

dupSSR23 {p. 26, lines 19-23, and p. 29, line 35, of *id.*}. Claim 61 recites a maize plant of Claim 53 having a novel band identified by SSR probe bnlgl805 {p. 29, line 4, and p. 30, line 3, of *id.*}.

The third claim set includes Claims 62-70. Claim 62 recites a maize plant having one or more restriction fragments selected from the group described in Tables 2 and 3 of the Specification {pp. 35-48 of *id.*}. The maize plant is produced by cross pollinating a maize female plant with either a (*Tripsacum* X teosinte) male plant or (teosinte X *Tripsacum*) male plant to produce a trigeneric plant {p. 13, lines 16-23, of *id.*}. The claimed maize plant therefore includes genetic contributions from gamagrass (*Tripsacum sp.*), teosinte (wild *Zea sp.*) and maize (*Zea mays* L. *ssp. mays*). The trigeneric plant is then backcrossed at least once to a (*Tripsacum* X teosinte) plant or (teosinte X *Tripsacum*) plant {p. 14, lines 8-13, of *id.*}. A more detailed description on crossing is located on pp. 30-31 of US Patent App. No. 10/614,255.

The citations do not describe the claimed backcrossed plant or its restriction fragments.

The maize plants of Claim 62 differ from the maize plants of Claim 44 and 53 by virtue of the parental lines used in the backcross. That is, in Claims 44 and 53, the trigeneric hybrid plant is backcrossed to a maize plant; whereas in Claim

62, the trigeneric hybrid plant is backcrossed to a (*Tripsacum* X teosinte) plant or (teosinte X *Tripsacum*) plant.

Claims 63-70 relate to Claim 62. Claim 63 recites products derived from the maize plant of Claim 62, including seed, pollen, subsequent generations, variants, mutants, modification and cellular components {p. 14, lines 13-18 of *id.*}. Claim 64 recites a maize plant of Claim 62 having roots with aerenchyma {p. 14, line 28; p.24, lines 3-4; p. 24, lines 17-22; p. 26, line 27, to p. 29, line 4; and p. 29, line 36, to p. 30, line 3, of *id.*}. Claim 65 recites a maize plant of Claim 62 having drought tolerance {p. 14, line 24, and p. 24, lines 1-2, of *id.*}. Claim 66 recites a maize plant of Claim 62 having tolerance to corn rootworm {p. 14, line 23; p. 24, line 1; p. 24, line 23, to p. 25, line 31; and p. 29, lines 31-35, of *id.*}. Claim 67 recites a maize plant of Claim 62 having a novel band identified by simple sequence repeat polymorphism (SSR) probe phi123 {p. 26, lines 19-23, and p. 29, line 35, of *id.*}. Claim 68 recites a maize plant of Claim 62 having a novel band identified by SSR probe bnlg2235 {p. 26, lines 19-23, and p. 29, lines 4 and 35, of *id.*}. Claim 69 recites a maize plant of Claim 62 having a novel band identified by SSR probe dupSSR23 {p. 26, lines 19-23, and p. 29, line 35, of *id.*}. Claim 70 recites a maize plant of Claim 62 having a novel band identified by SSR probe bnlg1805 {p. 29, line 4, and p. 30, line 3, of *id.*}.

10. Argument.

Claims 44-70 are Nonobvious Over the '547 Patent and Eubanks, *supra*.

In this rejection, the Examiner relies upon two (2) citations as disclosing hybrid plants having the claimed restriction fragments and parentage and then concludes that one of ordinary skill in the art would have found it obvious to obtain these plants based on the teachings of the citations.

The Supreme Court recently reiterated that the framework for objectively establishing obviousness requires an assessment of factual inquiries, known as the “Graham Factors,” which are set forth in *Graham v. John Deere Co.*, 383 U.S. 1 (1966). *KSR Int’l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007). Under the Graham Factors, an Examiner must determine the scope and content of the prior art; ascertain the differences between the prior art and the claims at issue; resolve the level of ordinary skill in the pertinent art; and consider any relevant secondary considerations. Such secondary considerations include the following: evidence of commercial success, long-felt, but unresolved need, failure of others and unexpected results.

In addition, the Court held that “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co.* at 1389. As such, “rejections on obviousness grounds cannot be sustained by mere conclusory

statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness" (*In re Kahn*, 441 F. 3d 977, 988 (Fed. Cir. 2006) (cited with approval in *KSR Int'l Co.*).

While *KSR* warns against a "rigid" application of the teaching-suggestion-motivation test (TSM) in assessing obviousness, the Court did hold that the presence or absence of a teaching, suggestion or motivation to combine citations provides a "helpful insight" regarding the obviousness of a claimed invention. *KSR Int'l Co.* at 1741.

Moreover, when assessing the obviousness of a claimed invention, prior art can be modified or combined to reject claims as *prima facie* obvious only if there is a reasonable expectation of success at the time the invention was made. MPEP § 2143.02. A reasonable expectation of success presupposes that one of ordinary skill in the art is capable of predicting before a research project is initiated -- rationally and on the basis of existing knowledge -- the successful conclusion of the project within an acceptable time limit. The more unexplored a technical field of research is, the more difficult it is to make predictions about the successful conclusion of the project, and the lower the expectation of success will be. Therefore, in making an assessment of the significance of the prior art, one should in an appropriate case take into account the degree to which reliable prediction can be made in the field. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

a. Scope and content of the prior art. As noted above in the Statement of Facts, the claimed invention is directed toward a hybrid maize plant obtained by backcrossing a trigeneric plant to one of its parental strains, such that the hybrid maize plant has at least one the recited restriction fragments. In this rejection, the Examiner determined that the art includes one of the Appellant's own patents and one of her prior publications. These citations were discussed in the present application (p. 6, line 22, p. 7, lines 8-9, p. 9, lines 10-12, p. 29, line 19, of US Patent Application No. 10/614,255).

When determining the scope and content of the prior art, the Examiner must cast his or her mind back to the time the invention was made and avoid impermissible hindsight. MPEP § 4121.01. The Examiner, however, seemingly ignored this rule and provided no weight to the fact that the author/applicant/inventor of the citations is the Appellant.

In addition, Director Jon Dudas recently highlighted the importance of an applicant in determining the art. On the alleged merits of requiring Applicants to undertake an art search and provide the Office with a search report as part of a "quality initiative" (*i.e.*, the "applicant quality submissions (AQS)" provision to the US Patent Reform Act, Senate Bill S.1145.), he stated "the applicant knows more about their invention [than] anyone else" {"Politics, power and power: this year's MIP 50," *Managing Intellectual Property*, p. 51 of July/August 2008}. The

Examiner, however, also disregarded Appellant's statement in her responses that at the time the application was filed, the claimed hybrid maize plants were not contemplated {p. 3, last paragraph of 06/30/2008 response} because it was not believed that such hybrid plants would be fertile **[[Is this the correct reason or please provide another explanation.]]**.

b. Differences between the prior art and the claims at issue. As noted above in the Statement of Facts, the pending claims are directed toward hybrid maize plants obtained by backcrossing a trigeneric plant (*i.e.*, maize X *Tripsacum* X teosinte) to a maize, (*Tripsacum* X teosinte) or (teosinte X *Tripsacum*) plant. In contrast, the citations are directed only toward trigeneric plants (*i.e.*, maize X *Tripsacum* X teosinte; '547 patent) and hybrids ((*Tripsacum* X teosinte), known as Tripsacorn, or (teosinte X *Tripsacum*), known as Sun Dance; *see*, Eubanks).

Obviousness, however, cannot be predicated on what is not known at the time an invention is made, even if the inherency of a certain feature is later established. MPEP § 4121.02. Although the claimed backcrossed plants did not previously exist, the Examiner has yet to address how the claimed plants and their restriction fragments could have been reasonably predicted, including the claimed restriction fragments, prior to their actual creation. As noted in the citations and the application, the art had difficulties in introgressing *Tripsacum* genetic material into maize {p. 5, line 34, to p. 6, line 2 of US Patent App. No. 10/614.255}. The

art also had difficulties in introgressing *Tripsacum* genetic material into other (*i.e.*, wild) *Zea* species {p. 6, line 34, to p. 7, line 1, of *id.*}. Given the difficulties encountered in crossing these species in view of the differences in chromosome numbers and ploidy, the art could not have reasonably predicted that the claimed plants would be fertile and would have the claimed restriction fragments.

Moreover, a prior art reference must be considered in its entirety (*i.e.*, as a whole), including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983). The art and application all note that not all crosses between these species are viable and that even if viable may be sterile. For example, the citations indicate that crosses between *Tripsacum* and maize result in sterile hybrids {p. 708, first full paragraph of Eubanks; Column 2, lines 11-14, of '547 patent; and p. 6, lines 3-5, of US Patent App. No. 10/314,255}, which therefore could not be used in further crosses or backcrosses. The citations also indicate that crosses between *Tripsacum* and annual teosintes failed until a cross using *Z. diploperennis* (a perennial teosinte) and *T. dactyloides* {p. 708, first full paragraph of Eubanks; and Column 2, lines 21-24, of '547 patent}. Furthermore, not all trigeneric plants from crossing these species are fertile {p. 6, lines 13-18, of US Patent App. No. 10/614,255}.

In further considering the art in its entirety, the Examiner alleges that the '547 patent teaches backcrossed trigeneric plants on Column 2, lines 30-34 {p. 4 of

11/14/2008 Office Action, which cites to p. 6 of 04/28/2008 Office Action}.

Appellant respectfully disagrees.

As previously noted, the '547 patent describes creating a trigeneric plant by crossing maize with *Tripsacorn* {Column 7, lines 14-23, of '547 patent}. It did not describe backcrossing a trigeneric plant (maize-*Tripsacum*-teosinte) to a maize or *Tripsacum*-teosinte hybrid (p. 3-4 of response dated 06/28/2008). The backcrosses described in the '547 patent to which the Examiner refers were only maize-*Tripsacum* hybrids {Column 2, line 28, of '547 patent}, which by virtue of only being a hybrid of two plants cannot be a trigeneric plant. In contrast, the claimed plants are trigeneric, even after backcrossing.

Moreover, the '547 patent disclosed that maize-*Tripsacum* hybrid backcrossing was unpredictable. As acknowledged by the Examiner, the '547 patent disclosed that transfer of "*Tripsacum* genetic material to maize ... required years of complicated, high risk breeding problems that involve many backcross generations to stabilize desirable *Tripsacum* genes in maize" {p. 6 of 11/14/2008 Office Action, citing Column 2, lines 28-34, of '547 patent}. Given that one of ordinary skill in the art had no way to reliably predict the results of backcrossing a maize-*Tripsacum* hybrid, he or she could not have reliably predicted the results of a more complicated backcross with a trigeneric plant. In fact, Appellant even noted that the art had not thought of or attempted backcrosses with a maize-

Tripsacum-tesonite hybrid at the time of the '547 patent {last full sentence on p. 3 of 06/28/2008 response}. The Examiner, however, seemingly applied little weight to this statement even though Appellant was the applicant/inventor of the '547 patent.

Eubanks does not bridge the gaps between the '547 patent and the claims. As noted above, Eubanks only describes methods to genetically analyze plants. It does not describe maize-*Tripsacum*-tesonite hybrids, the claimed backcrosses or restriction fragments. Without having the claimed maize-*Tripsacum*-tesonite hybrids, one of ordinary skill in the art could not have predicted *a priori* the restriction fragments. Thus, the Examiner inappropriately used the teaching of the application to reject Claims 44-70 as obvious over the '547 patent and Eubanks.

c. Level of ordinary skill in the art. As noted above in the Statement of Facts, the level of ordinary skill in the art is believed to be high, requiring a Ph.D. and additional training thereafter.

d. Relevant secondary considerations.

Once the Graham Factors are resolved, the Examiner should consider objective evidence relevant to obviousness and determine whether the claimed invention would have been obvious to one of ordinary skill in the art. MPEP § 2141. Of the secondary considerations, failure of others and unexpected results are important to this application.

As discussed above, the art itself presented many examples that teach away from the claimed plants on account of the failure of others. Moreover, Appellant presented strong evidence of the unexpectedness of such backcrosses {p. 20, lines 6-33, and the paragraph bridging pp. 23-24 of US Patent Application No. 10/314,255; and p. 4 of 06/28/2008 response}, as the art believed that *Tripsacum* genetic material would be lost {p. 4 of 06/28/2008 response}. For example, rather than inheriting an allele from each parent as expected under the principle of Mendelian inheritance, the claimed plants have novel alleles formed at precise genetic loci via a recombination of the parental genomes. The art simply could not have predicted the surprising number of novel alleles created by the crosses, which are recited in the claims. It was unexpected that such novel, recombinant alleles would be stably inherited to progeny, including the claimed backcrosses. Moreover, the Examiner has not provided any evidence showing that one of ordinary skill in the art could have reasonably predicted the claimed restriction fragments in the recited plants in view of the art-accepted doctrine of Mendelian inheritance.

e. Conclusion. In the present case, Appellant respectfully submits that the Examiner pieced together the invention by providing citations that allegedly teach the claim elements, without identifying a sufficient reason that would have

prompted one of ordinary skill in the art to combine the references to arrive at the claimed invention with a reasonable expectation of success.

Claims 44-70 are Nonobvious Over the '977 Patent and Eubanks, *supra*.

In this rejection, the Examiner relies upon two (2) citations as disclosing plants having the claimed restriction fragments and parentage and then concludes that one of ordinary skill would have found it obvious to obtain these plants based on the teachings of the allegedly interchangeable references.

The basic framework of obviousness is provided above for the rejection over the '547 patent and Eubanks.

a. Scope and content of the prior art. As noted above in the Statement of Facts, the claimed invention is directed toward a hybrid maize plant obtained by backcrossing a trigeneric plant to one of its parental strains, such that the hybrid maize plant has at least one the recited restriction fragments. In this rejection, the Examiner determined that the art includes one of the Appellant's own patents and one of her prior publications. These citations were discussed in the present application (p. 6, line 22, p. 7, lines 8-9, p. 9, lines 10-12, p. 29, line 19, of US Patent Application No. 10/614,255).

b. Differences between the prior art and the claims at issue. As the rejection above, this rejection relies upon Appellant's previous work. The pending claims

are directed toward hybrid maize plants obtained by backcrossing a trigeneric plant (*i.e.*, maize X *Tripsacum* X teosinte) to a maize, (*Tripsacum* X teosinte) or (teosinte X *Tripsacum*) plant. In contrast, the citations are directed toward (*Tripsacum* X teosinte) hybrids, known as Tripsacorn ('977 patent), or (teosinte X *Tripsacum*) hybrids, known as Sun Dance (Eubanks).

As argued in Appellant's previous response, the '977 patent describes creating an intergeneric (*i.e.*, having genetic contributions from two parents) plant by crossing a *Tripsacum* female parent (*i.e.*, a seed) with a maize male parent (*i.e.*, pollen) {Column 3, lines 50-58, of '977 patent}. It did not describe backcrossing a trigeneric plant (maize-*Tripsacum*-teosinte) to a maize or *Tripsacum*-teosinte hybrid (p. 3-4 of response dated 06/28/2008). The backcrosses in the '977 patent only used hybrid plants {Column 2, lines 18-21, of "977 patent}. In contrast, the claimed plants are trigeneric, even after backcrossing.

Eubanks does not bridge the gaps between the '977 patent and the claims. As noted above, Eubanks only describes methods to genetically analyze plants. It does not describe maize-*Tripsacum*-teosinte hybrids or the restriction fragments. Without having the claimed maize-*Tripsacum*-teosinte hybrids, one of ordinary skill in the art could not have predicted *a priori* the restriction fragments. Thus, the Examiner inappropriately used the teaching of the application to reject Claims 44-70 as obvious over the '977 patent and Eubanks.

c. Level of ordinary skill in the art. As noted above in the Statement of Facts, the level of ordinary skill in the art is believed to be high, requiring a Ph.D. and additional training thereafter.

d. Relevant secondary considerations. As discussed above, the art itself presented many examples that teach away from the claimed plants on account of the failure of others. Moreover, Appellant presented strong evidence of the unexpectedness of such backcrosses {p. 20, lines 6-33, and the paragraph bridging pp. 23-24 of US Patent Application No. 10/314,255; and p. 4 of 06/28/2008 response}, as the art believed that *Tripsacum* genetic material would be lost {p. 4 of 06/28/2008 response}. For example, rather than inheriting an allele from each parent as expected under the principle of Mendelian inheritance, the claimed plants have novel alleles formed at precise genetic loci via a recombination of the parental genomes. The art simply could not have predicted the surprising number of novel alleles created by the crosses, which are recited in the claims. It was unexpected that such novel, recombinant alleles would be stably inherited to progeny, including the claimed backcrosses. Moreover, the Examiner has not provided any evidence showing that one of ordinary skill in the art could have reasonably predicted the claimed restriction fragments in the recited plants in view of the art-accepted doctrine of Mendelian inheritance.

e. Conclusion. In the present case, Appellant respectfully submits that the Examiner pieced together the invention by providing citations that allegedly teach the claim elements, without identifying a sufficient reason that would have prompted one of ordinary skill in the art to combine the references to arrive at the claimed invention with a reasonable expectation of success.

Conclusion

Appellant maintains that the Examiner has not demonstrated a *prima facie* case of obviousness in view of the citations. The combination of citations pertain at best to creating maize-*Tripsacum* hybrids, but fail to contemplate or disclose the claimed backcrossed plants and restriction fragments. For the reasons presented above in detail, Appellant respectfully requests that the rejections be overturned.

11. Appendix.

a. Claims

1.-22. (Canceled)

23 (Pending) A method of identifying a maize progeny plant having a restriction fragment introgressed from a *Tripsacum*/teosinte hybrid, said method comprising the following steps:

- (a) isolating the total genomic DNA from the plant;
- (b) digesting said genomic DNA with one to five of the restriction enzymes selected from the group consisting of *EcoRI*, *EcoRV*, *HindIII*, *BamHI* and *MspI*;
- (c) probing said digested genomic DNA with one or more probes, to identify one or more restriction fragments, selected from the group consisting of BNL5.62, *EcoRI*, 10.3 kb; np197, *HindIII*, 3.9 kb; UMC157, *EcoRI*, 6.5 kb and 3.3 kb; UMC157, *HindIII*, 5.5 kb; UMC157, *BamHI*, 14.0 kb, 8.5 kb and 4.5 kb; UMC11, *BamHI*, 7.0 kb; CSU3, *BamHI*, 10.0 kb and 7.6 kb; UMC67, *EcoRI*, 19.2 kb; UMC67, *BamHI* 13.4 kb, 11.0 kb and 1.6 kb; CSU92, *BamHI*, 13.3 kb and 7.5 kb; asg62, *BamHI*, 12.7 kb, 9.7 kb and 6.6 kb; UMC58, *HindIII*, 3.3 kb; CSU164, *EcoRI*, 9.0 kb and 7.0 kb; UMC128, *HindIII*, 6.0 kb; UMC107, *EcoRI*, 7.5.0 kb, 6.3 kb and 6.1 kb; UMC140, *EcoRI*, 4.9 kb; UMC140, *HindIII*, 6.5 kb; adhl, *HindIII*, 9.4 kb; adhl, *BamHI*, 9.4 kb; UMC161, *HindIII*, 3.3 kb; BNL8.29, *HindIII*, 9.3 kb and 8.3 kb; UMC53, *EcoRI*, 9.4 kb; UMC53, *EcoRV*, 8.4 kb, 3.8 kb and 3.0 kb; UMC6, *EcoRI*, 3.8 kb; UMC6, *HindIII* 9.4 kb; UMC6, *BamHI*, 13.2 kb, 12.7 kb and 7.0 kb; UMC61, *HindIII*, 3.4 and 2.8 kb *agrr167*, *BamHI*, 5.7 kb, 4.5 kb and 4.0 kb; UMC34, *EcoRI*, 7.5 kb and 5.4 kb; UMC34, *HindIII*, 8.8 kb, 6.5 kb and 5.8 kb; UMC34, *BamHI*, 9.4 kb; UMC135, *HindIII*, 11.6 kb and 10.8 kb; UMC131, *EcoRI*, 10.6 kb, 5.8 kb and 4.3 kb; UMC55, *EcoRI*, 3.9 kb; UMC55, *HindIII*, 4.3 kb; UMC5, *EcoRI*, 5.4 kb; UMC5, *HindIII*, 6.5 kb; UMC49, *BamHI*,

8.2 kb; UMC36, *Bam*HI, 4.2 kb; UMC32, *Eco*RI, 5.3 kb; UMC32, *Hind*III 6.7 kb, 6.0 kb and 2.8 kb; *asg24*, *Hind*III, 7.2 kb and 6.4 kb; UMC121, *Eco*RI, 3.7 kb and 3.2 kb; BNL8.35, *Hind*III, 9.9 kb and 8.7 kb; UMC50, *Bam*HI, 7.8 kb, 6.8 kb, 5.8 kb and 3.8 kb; UMC42, *Hind*III, 10.4 kb, 9.2 kb, 8.9 kb, 7.9 kb, 7.6 kb and 3.7 kb; *npi247*, *Eco*RI, 8.0 kb; *npi247*, *Hind*III 3.0 kb; UMC1O, *Hind*III, 3.0 kb; UMC1O, *Eco*RI, 6.5 kb and 5.5 kb; UMC102, *Eco*RI, 2.7 kb; BNL6.06, *Eco*RI, 6.8 kb; CSU240, *Eco*RI, 10.6 kb, 4.5 kb and 3.3 kb; BNL5.37, *Hind*III, 10.3 kb, 5.8 kb and 3.5 kb; *npi296*, *Eco*RI, 7.9 kb; UMC3, *Eco*RI 2.5 kb and 2.0 kb; *npi212*, *Hind*III, 4.3 kb; *npi212*, *Bam*HI, 5.4 kb; UMC39, *Eco*RI, 12.2 kb, 9.2 kb, 7.8 kb and 7.1 kb; *phi10080*, *Bam*HI, 9.7 kb; UMC63, *Hind*III, 9.5 kb and 4.3 kb; CSU303, *Eco*RI, 10.0 kb; UMC96, *Hind*III, 11.8 kb, 6.4 kb and 5.5 kb; UMC96, *Bam*HI, 7.5 kb; UMC2, *Eco*RI, 11.8 kb, 10.4 kb, 8.0 kb and 3.9 kb; CSU25, *Hind*III, 5.2 kb, 4.5 kb and 4.2 kb; *agrr115*, *Eco*RI. 8.0 kb and 5.4 kb; *agrr115*, *Bam*HI, 5.4 kb and 3.5 kb; *phi20725*, *Eco*RI, 10.3 kb, 9.7 kb and 7.2 kb; *phi20725*, *Hind*III, 1.5 kb; UMC31, *Eco*RI, 5.8 kb and 2.0 kb; UMC31, *Bam*HI 6.5 kb; UMC55, *Eco*RI, 3.9 kb; UMC55, *Hind*III, 4.3 kb; CSU235, *Hind*III, 6.8 kb and 3.0 kb; CSU585, *Hind*III, 8.3 kb and 6.1 kb; BNL5.46, *Hind*III, 13.7 kb, 10.5 kb, 9.7 kb and 5.1 kb; *agrr321*, *Bam*HI, 5.5 kb; *agrr89*, *Hind*III, 7.1 kb; *npi386*, *Hind*III, 12.6 kb, 9.3 kb and 8.2 kb; UMC42, *Hind*III, 19.2 kb, 10.3 kb 8.9 kb, 7.6 kb, 3.7 kb and 3.0 kb; *tda62*, *Bam*HI, 5.5 kb, 5.2 kb, 4.8 kb and 4.2 kb; BNL5.71, *Eco*RV , 11.3 kb, 6.8 kb and

5.7 kb; UMC156, *Hind*III, 3.0 kb; UMC66, *Eco*RI, 10.5 kb; UMC66, *Bam*HI, 3.7 kb and 2.4 kb; UMC19, *Bam*HI, 12.3 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; UMC133, *Hind*III, 10.6 kb, 9.9 kb, 9.2 kb and 7.7 kb; UMC52, *Bam*HI, 8.7 kb, 6.9 kb, 3.8 kb, 3.0 kb and 2.0 kb; BNL15.07, *Hind*III, 2.9 kb and 2.7 kb; np1409, *Eco*RI, 9.4 kb; np1409, *Hind*III, 10.4 kb, 9.0 kb and 3.9 kb; UMC147, *Hind*III, 16.3 kb, 3.8 kb and 2.4 kb; asg73, *Eco*RI, 3.8 kb; UMC90, *Hind*III, 7.7 kb, 6.5 kb, 2.8 kb and 1.6 kb; UMC90, *Bam*HI, 9.0 kb; UMC72, *Eco*RI, 8.5 kb; UMC27, *Hind*III, 8.3 kb and 4.5 kb; UMC27, *Bam*HI, 6.5 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; tda37, *Bam*HI, 9.0 kb, 8.0 kb and 6.4 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; UMC40, *Bam*HI, 7.2 kb, 4.7 kb and 4.3 kb; BNL7.71, *Hind*III, 10.6 kb; BNL5.71, *Bam*HI, 11.3 kb, 6.8 kb and 5.7 kb; tda62, *Bam*HI, 6.5 kb and 5.5 kb; UMC68, *Hind*III, 6.0 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; phi10017, *Bam*HI, 15.1 kb and 9.5 kb; tda50, *Bam*HI, 8.5 kb; np1373, *Hind*III, 6.5 kb, 5.6 kb, 5.1 kb and 3.0 kb; tda204, *Bam*HI, 4.0 kb; np1393, *Eco*RI, 12.1 kb, 8.5 kb, 7.0 kb and 5.6 kb; UMC65, *Hind*III, 2.9 kb; UMC46, *Eco*RI, 6.5 kb and 5.6 kb; asg7, *Hind*III, 6.3 kb; UMC28, *Hind*III, 15.8 kb and 11.9 kb; UMC28, *Bam*HI, 9.9 kb, 7.6 kb and 6.6 kb; UMC134, *Hind*III, 7.5 kb and 4.7 kb; asg8, *Hind*III, 10.8 kb, 8.7 kb and 8.4 kb; phi20581, *Hind*III, 4.2 kb; O2, *Eco*RI, 9.4 kb; asg34, *Hind*III, 4.5 kb; BNL15.40, *Hind*III, 5.8 kb; UMC116, *Eco*RI, 9.5 kb; UMC110, *Bam*HI, 10.6 kb, 4.9 kb and

3.9 kb; BNL8.32, *Hind*III, 8.9 kb, 7.4 kb and 7.1 kb; BNL14.07, *Eco*RI, 6.4 kb; UMC80, *Hind*III, 10.7 kb, 8.2 kb and 2.4 kb; BNL16.06, *Eco*RI, 6.8 kb and 1.9 kb; BNL16.06, *Hind*III, 5.7 kb, 3.0 kb and 1.6 kb; phi20020, *Hind*III, 7.8 kb, 6.6 kb and 5.1 kb; np114, *Hind*III, 10.0 kb, 8.8 kb and 6.3 kb; BNL9.11, *Hind*III, 3.4 kb; UMC103, *Hind*III, 6.9 kb; UMC124, *Hind*III, 8.0 and 7.0; UMC124, *Bam*HI, 6.6 kb, 2.6 kb and 1.6 kb; UMC120, *Hind*III, 3.2 kb, 2.3 kb and 1.4 kb; UMC89, *Eco*RI, 7.3 kb; UMC89, *Hind*III, 7.3 kb; UMC89, *Bam*HI, 9.5 kb, 6.0 kb, 5.2 kb and 4.5 kb; UMC89, *Msp*I, 6.7 kb and 5.8 kb; BNL12.30, *Eco*RI, 3.5 kb; UMC48, *Hind*III, 6.2 kb, 5.3 kb, 4.7 kb, 4.2 kb and 3.5 kb; UMC53, *Eco*RI, 3.8 kb and 3.0 kb; UMC53, *Eco*RV, 8.4 kb; np1268, *Bam*HI, 6.4 kb; UMC7, *Bam*HI, 4.2 kb; UMC3, *Eco*RI, 3.5 kb and 2.0 kb; phi0005, *Eco*RI, 15.0 kb and 1.6 kb; UMC113, *Eco*RI, 5.9 kb and 5.4 kb; UMC113, *Bam*HI, 12.8 kb, 11.8 kb and 10.5 kb; UMC192, *Hind*III, 11.4 kb and 6.4 kb; wx (waxy), *Hind*III, 21.0 kb; UMC105, *Eco*RI, 3.9 kb; CSU147, *Hind*III 5.9 kb; BNL5.10, *Hind*III, 6.1 kb and 4.4 kb; UMC114, *Bam*HI, 12.6 kb, 11.5 kb, 10.0 kb, 8.8 kb, 7.5 kb and 6.5 kb; UMC95, *Eco*RI, 5.6 kb; UMC95, *Hind*III, 7.7 kb, 7.3 kb, 4.8 kb, 4.5 kb, 4.1 kb and 1.7 kb; UMC95, *Bam*HI, 15.0 kb and 9.0 kb; asg44, *Eco*RI, 5.3 kb; CSU61, *Eco*RI, 8.1 kb and 4.8 kb; BNL7.57, *Bam*HI, 11.6 kb and 5.9 kb; CSU54, *Eco*RI, 14.7 kb and 12.6 kb; phi20075, *Eco*RI, 7.1 kb; np1285, *Eco*RI, 12.4 kb, 9.4 kb and 6.0 kb; KSU5, *Eco*RI, 9.8 kb, 7.6 kb, 6.1 kb, 3.8 kb and 3.5 kb; UMC130, *Eco*RI, 13.5 kb

and 7.0 kb; UMC130, *HindIII*, 4.8 kb and 3.2 kb; UMC130, *BamHI*, 3.2 kb; UMC64, *HindIII*, 3.3 kb; UMC152, *HindIII*, 12.4 kb, 7.1 kb and 5.6 kb; phi06005, *EcoRI*, 12.8 kb; UMC163, *HindIII*, 7.0 kb, 4.8 kb, 3.0 kb, 2.6 kb and 2.3 kb; UMC44, *HindIII*, 9.8 kb, 8.7 kb, 7.2 kb, 5.5 kb and 4.0 kb; BNL10.13, *HindIII*, 10.8 kb; np1306, *HindIII*, 7.0 kb; pmt1, *HindIII*, 2.3 kb; pmt2, *HindIII*, 2.8 kb and 2.1 kb; pmt5, *HindIII*, 12.3 kb, 8.1 kb, 3.6 kb, 3.2 kb and 2.5 kb; tda48, *HindIII*, 8.2 kb; tda53, *HindIII*, 3.8 kb and 2.2 kb; tda168, *EcoRI*, 3.6 kb; tda16, *HindIII*, 4.3 kb; and tda17, *HindIII*, 7.0 kb; tda250, *BamHI*, 4.0 kb, recited as marker-enzyme fragment size;

(d) determining the presence of one or more of the restriction fragments.

24.-43. (Canceled)

44. (Rejected) A maize plant comprising one or more restriction fragments selected from the group consisting of:

BNL5.62, *EcoRI*, 10.3 kb; np197, *HindIII*, 3.9 kb; UMC157, *EcoRI*, 6.5 kb and 3.3 kb; UMC157, *HindIII*, 5.5 kb; UMC157, *BamHI*, 14.0 kb, 8.5 kb and 4.5 kb; UMC11, *BamHI*, 7.0 kb; CSU3, *BamHI*, 10.0 kb and 7.6 kb; UMC67, *EcoRI*, 19.2 kb; UMC67, *BamHI* 13.4 kb, 11.0 kb and 1.6 kb; CSU92, *BamHI*, 13.3 kb and 7.5 kb; asg62, *BamHI*, 12.7 kb, 9.7 kb and 6.6 kb; UMC58, *HindIII*, 3.3 kb; CSU164,

EcoRI, 9.0 kb and 7.0 kb; UMC128, *HindIII*, 6.0 kb; UMC107, *EcoRI*, 7.5.0 kb, 6.3 kb and 6.1 kb; UMC140, *EcoRI*, 4.9 kb; UMC140, *HindIII*, 6.5 kb; *adhI*, *HindIII*, 9.4 kb; *adhI*, *BamHI*, 9.4 kb; UMC161, *HindIII*, 3.3 kb; BNL8.29, *HindIII*, 9.3 kb and 8.3 kb; UMC53, *EcoRI*, 9.4 kb; UMC53, *EcoRV*, 8.4 kb, 3.8 kb and 3.0 kb; UMC6, *EcoRI*, 3.8 kb; UMC6, *HindIII* 9.4 kb; UMC6, *BamHI*, 13.2 kb, 12.7 kb and 7.0 kb; UMC61, *HindIII*, 3.4 and 2.8 kb *agrr167*, *BamHI*, 5.7 kb, 4.5 kb and 4.0 kb; UMC34, *EcoRI*, 7.5 kb and 5.4 kb; UMC34, *HindIII*, 8.8 kb, 6.5 kb and 5.8 kb; UMC34, *BamHI*, 9.4 kb; UMC135, *HindIII*, 11.6 kb and 10.8 kb; UMC131, *EcoRI*, 10.6 kb, 5.8 kb and 4.3 kb; UMC55, *EcoRI*, 3.9 kb; UMC55, *HindIII*, 4.3 kb; UMC5, *EcoRI*, 5.4 kb; UMC5, *HindIII*, 6.5 kb; UMC49, *BamHI*, 8.2 kb; UMC36, *BamHI*, 4.2 kb; UMC32, *EcoRI*, 5.3 kb; UMC32, *HindIII* 6.7 kb, 6.0 kb and 2.8 kb; *asg24*, *HindIII*, 7.2 kb and 6.4 kb; UMC121, *EcoRI*, 3.7 kb and 3.2 kb; BNL8.35, *HindIII*, 9.9 kb and 8.7 kb; UMC50, *BamHI*, 7.8 kb, 6.8 kb, 5.8 kb and 3.8 kb; UMC42, *HindIII*, 10.4 kb, 9.2 kb, 8.9 kb, 7.9 kb, 7.6 kb and 3.7 kb; *npi247*, *EcoRI*, 8.0 kb; *npi247*, *HindIII* 3.0 kb; UMC1O, *HindIII*, 3.0 kb; UMC1O, *EcoRI*, 6.5 kb and 5.5 kb; UMC102, *EcoRI*, 2.7 kb; BNL6.06, *EcoRI*, 6.8 kb; CSU240, *EcoRI*, 10.6 kb, 4.5 kb and 3.3 kb; BNL5.37, *HindIII*, 10.3 kb, 5.8 kb and 3.5 kb; *npi296*, *EcoRI*, 7.9 kb; UMC3, *EcoRI* 2.5 kb and 2.0 kb; *npi212*, *HindIII*, 4.3 kb; *npi212*, *BamHI*, 5.4 kb; UMC39, *EcoRI*, 12.2 kb, 9.2 kb, 7.8 kb and 7.1 kb; *phi10080*, *BamHI*, 9.7 kb; UMC63, *HindIII*, 9.5 kb and 4.3 kb; CSU303, *EcoRI*,

10.0 kb; UMC96, *Hind*III, 11.8 kb, 6.4 kb and 5.5 kb; UMC96, *Bam*HI, 7.5 kb; UMC2, *Eco*RI, 11.8 kb, 10.4 kb, 8.0 kb and 3.9 kb; CSU25, *Hind*III, 5.2 kb, 4.5 kb and 4.2 kb; agrr115, *Eco*RI, 8.0 kb and 5.4 kb; agrr115, *Bam*HI, 5.4 kb and 3.5 kb; phi20725, *Eco*RI, 10.3 kb, 9.7 kb and 7.2 kb; phi20725, *Hind*III, 1.5 kb; UMC31, *Eco*RI, 5.8 kb and 2.0 kb; UMC31, *Bam*HI 6.5 kb; UMC55, *Eco*RI, 3.9 kb; UMC55, *Hind*III, 4.3 kb; CSU235, *Hind*III, 6.8 kb and 3.0 kb; CSU585, *Hind*III, 8.3 kb and 6.1 kb; BNL5.46, *Hind*III, 13.7 kb, 10.5 kb, 9.7 kb and 5.1 kb; agrr321, *Bam*HI, 5.5 kb; agrr89, *Hind*III, 7.1 kb; np1386, *Hind*III, 12.6 kb, 9.3 kb and 8.2 kb; UMC42, *Hind*III, 19.2 kb, 10.3 kb 8.9 kb, 7.6 kb, 3.7 kb and 3.0 kb; tda62, *Bam*HI, 5.5 kb, 5.2 kb, 4.8 kb and 4.2 kb; BNL5.71, *Eco*RV , 11.3 kb, 6.8 kb and 5.7 kb; UMC156, *Hind*III, 3.0 kb; UMC66, *Eco*RI, 10.5 kb; UMC66, *Bam*HI, 3.7 kb and 2.4 kb; UMC19, *Bam*HI, 12.3 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; UMC133, *Hind*III, 10.6 kb, 9.9 kb, 9.2 kb and 7.7 kb; UMC52, *Bam*HI, 8.7 kb, 6.9 kb, 3.8 kb, 3.0 kb and 2.0 kb; BNL15.07, *Hind*III, 2.9 kb and 2.7 kb; np1409, *Eco*RI, 9.4 kb; np1409, *Hind*III, 10.4 kb, 9.0 kb and 3.9 kb; UMC147, *Hind*III, 16.3 kb, 3.8 kb and 2.4 kb; asg73, *Eco*RI, 3.8 kb; UMC90, *Hind*III, 7.7 kb, 6.5 kb, 2.8 kb and 1.6 kb; UMC90, *Bam*HI, 9.0 kb; UMC72, *Eco*RI, 8.5 kb; UMC27, *Hind*III, 8.3 kb and 4.5 kb; UMC27, *Bam*HI, 6.5 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; tda37, *Bam*HI, 9.0 kb, 8.0 kb and 6.4 kb; UMC43, *Bam*HI, 9.7 kb, 7.3 kb and 5.7 kb; UMC40, *Bam*HI, 7.2 kb, 4.7 kb

and 4.3 kb; BNL7.71, *Hind*III, 10.6 kb; BNL5.71, *Bam*HI, 11.3 kb, 6.8 kb and 5.7 kb; tda62, *Bam*HI, 6.5 kb and 5.5 kb; UMC68, *Hind*III, 6.0 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; phi10017, *Bam*HI, 15.1 kb and 9.5 kb; tda50, *Bam*HI, 8.5 kb; np1373, *Hind*III, 6.5 kb, 5.6 kb, 5.1 kb and 3.0 kb; tda204, *Bam*HI, 4.0 kb; np1393, *Eco*RI, 12.1 kb, 8.5 kb, 7.0 kb and 5.6 kb; UMC65, *Hind*III, 2.9 kb; UMC46, *Eco*RI, 6.5 kb and 5.6 kb; asg7, *Hind*III, 6.3 kb; UMC28, *Hind*III, 15.8 kb and 11.9 kb; UMC28, *Bam*HI, 9.9 kb, 7.6 kb and 6.6 kb; UMC134, *Hind*III, 7.5 kb and 4.7 kb; asg8, *Hind*III, 10.8 kb, 8.7 kb and 8.4 kb; phi20581, *Hind*III, 4.2 kb; O2, *Eco*RI, 9.4 kb; asg34, *Hind*III, 4.5 kb; BNL15.40, *Hind*III, 5.8 kb; UMC116, *Eco*RI, 9.5 kb; UMC110, *Bam*HI, 10.6 kb, 4.9 kb and 3.9 kb; BNL8.32, *Hind*III, 8.9 kb, 7.4 kb and 7.1 kb; BNL14.07, *Eco*RI, 6.4 kb; UMC80, *Hind*III, 10.7 kb, 8.2 kb and 2.4 kb; BNL16.06, *Eco*RI, 6.8 kb and 1.9 kb; BNL16.06, *Hind*III, 5.7 kb, 3.0 kb and 1.6 kb; phi20020, *Hind*III, 7.8 kb, 6.6 kb and 5.1 kb; np114, *Hind*III, 10.0 kb, 8.8 kb and 6.3 kb; BNL9.11, *Hind*III, 3.4 kb; UMC103, *Hind*III, 6.9 kb; UMC124, *Hind*III, 8.0 and 7.0; UMC124, *Bam*HI, 6.6 kb, 2.6 kb and 1.6 kb; UMC120, *Hind*III, 3.2 kb, 2.3 kb and 1.4 kb; UMC89, *Eco*RI, 7.3 kb; UMC89, *Hind*III, 7.3 kb; UMC89, *Bam*HI, 9.5 kb, 6.0 kb, 5.2 kb and 4.5 kb; UMC89, *Msp*I, 6.7 kb and 5.8 kb; BNL12.30, *Eco*RI, 3.5 kb; UMC48, *Hind*III, 6.2 kb, 5.3 kb, 4.7 kb, 4.2 kb and 3.5 kb; UMC53, *Eco*RI, 3.8 kb and 3.0 kb; UMC53, *Eco*RV, 8.4 kb; np1268, *Bam*HI, 6.4 kb; UMC7, *Bam*HI, 4.2 kb;

UMC3, *EcoRI*, 3.5 kb and 2.0 kb; phil0005, *EcoRI*, 15.0 kb and 1.6 kb; UMC113, *EcoRI*, 5.9 kb and 5.4 kb; UMC113, *BamHI*, 12.8 kb, 11.8 kb and 10.5 kb; UMC192, *HindIII*, 11.4 kb and 6.4 kb; wx (waxy), *HindIII*, 21.0 kb; UMC105, *EcoRI*, 3.9 kb; CSU147, *HindIII* 5.9 kb; BNL5.10, *HindIII*, 6.1 kb and 4.4 kb; UMC114, *BamHI*, 12.6 kb, 11.5 kb, 10.0 kb, 8.8 kb, 7.5 kb and 6.5 kb; UMC95, *EcoRI*, 5.6 kb; UMC95, *HindIII*, 7.7 kb, 7.3 kb, 4.8 kb, 4.5 kb, 4.1 kb and 1.7 kb; UMC95, *BamHI*, 15.0 kb and 9.0 kb; asg44, *EcoRI*, 5.3 kb; CSU61, *EcoRI*, 8.1 kb and 4.8 kb; BNL7.57, *BamHI*, 11.6 kb and 5.9 kb; CSU54, *EcoRI*, 14.7 kb and 12.6 kb; phi20075, *EcoRI*, 7.1 kb; np1285, *EcoRI*, 12.4 kb, 9.4 kb and 6.0 kb; KSU5, *EcoRI*, 9.8 kb, 7.6 kb, 6.1 kb, 3.8 kb and 3.5 kb; UMC130, *EcoRI*, 13.5 kb and 7.0 kb; UMC130, *HindIII*, 4.8 kb and 3.2 kb; UMC130, *BamHI*, 3.2 kb; UMC64, *HindIII*, 3.3 kb; UMC152, *HindIII*, 12.4 kb, 7.1 kb and 5.6 kb; phi06005, *EcoRI*, 12.8 kb; UMC163, *HindIII*, 7.0 kb, 4.8 kb, 3.0 kb, 2.6 kb and 2.3 kb; UMC44, *HindIII*, 9.8 kb, 8.7 kb, 7.2 kb, 5.5 kb and 4.0 kb; BNL10.13, *HindIII*, 10.8 kb; np1306, *HindIII*, 7.0 kb; pmt1, *HindIII*, 2.3 kb; pmt2, *HindIII*, 2.8 kb and 2.1 kb; pmt5, *HindIII*, 12.3 kb, 8.1 kb, 3.6 kb, 3.2 kb and 2.5 kb; tda48, *HindIII*, 8.2 kb; tda53, *HindIII*, 3.8 kb and 2.2 kb; tda168, *EcoRI*, 3.6 kb; tda16, *HindIII*, 4.3 kb; and tda17, *HindIII*, 7.0 kb; tda250, *BamHI*, 4.0 kb, recited as marker-enzyme fragment size;

wherein said maize plant is produced by:

(a) cross pollinating a maize female plant with either a (*Tripsacum* X teosinte) male plant or a (teosinte X *Tripsacum*) male plant to produce a trigeneric hybrid maize plant;

(b) backcrossing said trigeneric hybrid plant produced in step (a) at least once to a maize plant.

45. (Rejected) A seed, pollen, all derivatives, subsequent generations, variants, mutants, modifications, and cellular components produced by the plant of claim 44.

46. (Rejected) A maize plant according to claim 44 whereby the roots of said plant contain aerenchyma.

47. (Rejected) A maize plant according to claim 44 whereby said plant is drought tolerant.

48. (Rejected) A maize plant according to claim 44 whereby said plant is tolerant to corn rootworm.

49. (Rejected) A maize plant according to claim 44 further comprising a novel band identified by SSR probe phi 123.

50. (Rejected) A maize plant according to claim 44 further comprising a novel band identified by SSR probe bnlg2235.

51. (Rejected) A maize plant according to claim 44 further comprising a novel band identified by SSR probe dupSSR23.

52. (Rejected) A maize plant according to claim 44 further comprising a novel band identified by SSR probe bnlg1805.

53 (Rejected) A maize plant comprising one or more restriction fragments selected from the group consisting of

BNL5.62, *Eco*RI, 10.3 kb; npi97, *Hind*III, 3.9 kb; UMC157, *Eco*RI, 6.5 kb and 3.3 kb; UMC157, *Hind*III, 5.5 kb; UMC157, *Bam*HI, 14.0 kb, 8.5 kb and 4.5 kb; UMC11, *Bam*HI, 7.0 kb; CSU3, *Bam*HI, 10.0 kb and 7.6 kb; UMC67, *Eco*RI, 19.2 kb; UMC67, *Bam*HI 13.4 kb, 11.0 kb and 1.6 kb; CSU92, *Bam*HI, 13.3 kb and 7.5 kb; asg62, *Bam*HI, 12.7 kb, 9.7 kb and 6.6 kb; UMC58, *Hind*III, 3.3 kb; CSU164, *Eco*RI, 9.0 kb and 7.0 kb; UMC128, *Hind*III, 6.0 kb; UMC107, *Eco*RI, 7.5.0 kb,

6.3 kb and 6.1 kb; UMC140, *EcoRI*, 4.9 kb; UMC140, *HindIII*, 6.5 kb; *adhI*,
HindIII, 9.4 kb; *adhI*, *BamHI*, 9.4 kb; UMC161, *HindIII*, 3.3 kb; BNL8.29,
HindIII, 9.3 kb and 8.3 kb; UMC53, *EcoRI*, 9.4 kb; UMC53, *EcoRV*, 8.4 kb, 3.8
kb and 3.0 kb; UMC6, *EcoRI*, 3.8 kb; UMC6, *HindIII* 9.4 kb; UMC6, *BamHI*, 13.2
kb, 12.7 kb and 7.0 kb; UMC61, *HindIII*, 3.4 and 2.8 kb *agrr167*, *BamHI*, 5.7 kb,
4.5 kb and 4.0 kb; UMC34, *EcoRI*, 7.5 kb and 5.4 kb; UMC34, *HindIII*, 8.8 kb, 6.5
kb and 5.8 kb; UMC34, *BamHI*, 9.4 kb; UMC135, *HindIII*, 11.6 kb and 10.8 kb;
UMC131, *EcoRI*, 10.6 kb, 5.8 kb and 4.3 kb; UMC55, *EcoRI*, 3.9 kb; UMC55,
HindIII, 4.3 kb; UMC5, *EcoRI*, 5.4 kb; UMC5, *HindIII*, 6.5 kb; UMC49, *BamHI*,
8.2 kb; UMC36, *BamHI*, 4.2 kb; UMC32, *EcoRI*, 5.3 kb; UMC32, *HindIII* 6.7 kb,
6.0 kb and 2.8 kb; *asg24*, *HindIII*, 7.2 kb and 6.4 kb; UMC121, *EcoRI*, 3.7 kb and
3.2 kb; BNL8.35, *HindIII*, 9.9 kb and 8.7 kb; UMC50, *BamHI*, 7.8 kb, 6.8 kb, 5.8
kb and 3.8 kb; UMC42, *HindIII*, 10.4 kb, 9.2 kb, 8.9 kb, 7.9 kb, 7.6 kb and 3.7 kb;
npi247, *EcoRI*, 8.0 kb; *npi247*, *HindIII* 3.0 kb; UMC10, *HindIII*, 3.0 kb; UMC10,
EcoRI, 6.5 kb and 5.5 kb; UMC102, *EcoRI*, 2.7 kb; BNL6.06, *EcoRI*, 6.8 kb;
CSU240, *EcoRI*, 10.6 kb, 4.5 kb and 3.3 kb; BNL5.37, *HindIII*, 10.3 kb, 5.8 kb and
3.5 kb; *npi296*, *EcoRI*, 7.9 kb; UMC3, *EcoRI* 2.5 kb and 2.0 kb; *npi212*, *HindIII*,
4.3 kb; *npi212*, *BamHI*, 5.4 kb; UMC39, *EcoRI*, 12.2 kb, 9.2 kb, 7.8 kb and 7.1 kb;
phi10080, *BamHI*, 9.7 kb; UMC63, *HindIII*, 9.5 kb and 4.3 kb; CSU303, *EcoRI*,
10.0 kb; UMC96, *HindIII*, 11.8 kb, 6.4 kb and 5.5 kb; UMC96, *BamHI*, 7.5 kb;

UMC2, *EcoRI*, 11.8 kb, 10.4 kb, 8.0 kb and 3.9 kb; CSU25, *HindIII*, 5.2 kb, 4.5 kb and 4.2 kb; agrr115, *EcoRI*, 8.0 kb and 5.4 kb; agrr115, *BamHI*, 5.4 kb and 3.5 kb; phi20725, *EcoRI*, 10.3 kb, 9.7 kb and 7.2 kb; phi20725, *HindIII*, 1.5 kb; UMC31, *EcoRI*, 5.8 kb and 2.0 kb; UMC31, *BamHI* 6.5 kb; UMC55, *EcoRI*, 3.9 kb; UMC55, *HindIII*, 4.3 kb; CSU235, *HindIII*, 6.8 kb and 3.0 kb; CSU585, *HindIII*, 8.3 kb and 6.1 kb; BNL5.46, *HindIII*, 13.7 kb, 10.5 kb, 9.7 kb and 5.1 kb; agrr321, *BamHI*, 5.5 kb; agrr89, *HindIII*, 7.1 kb; np1386, *HindIII*, 12.6 kb, 9.3 kb and 8.2 kb; UMC42, *HindIII*, 19.2 kb, 10.3 kb 8.9 kb, 7.6 kb, 3.7 kb and 3.0 kb; tda62, *BamHI*, 5.5 kb, 5.2 kb, 4.8 kb and 4.2 kb; BNL5.71, *EcoRV* , 11.3 kb, 6.8 kb and 5.7 kb; UMC156, *HindIII*, 3.0 kb; UMC66, *EcoRI*, 10.5 kb; UMC66, *BamHI*, 3.7 kb and 2.4 kb; UMC19, *BamHI*, 12.3 kb; UMC104, *HindIII*, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *BamHI*, 9.4 kb; UMC133, *HindIII*, 10.6 kb, 9.9 kb, 9.2 kb and 7.7 kb; UMC52, *BamHI*, 8.7 kb, 6.9 kb, 3.8 kb, 3.0 kb and 2.0 kb; BNL15.07, *HindIII*, 2.9 kb and 2.7 kb; np1409, *EcoRI*, 9.4 kb; np1409, *HindIII*, 10.4 kb, 9.0 kb and 3.9 kb; UMC147, *HindIII*, 16.3 kb, 3.8 kb and 2.4 kb; asg73, *EcoRI*, 3.8 kb; UMC90, *HindIII*, 7.7 kb, 6.5 kb, 2.8 kb and 1.6 kb; UMC90, *BamHI*, 9.0 kb; UMC72, *EcoRI*, 8.5 kb; UMC27, *HindIII*, 8.3 kb and 4.5 kb; UMC27, *BamHI*, 6.5 kb; UMC43, *BamHI*, 9.7 kb, 7.3 kb and 5.7 kb; tda37, *BamHI*, 9.0 kb, 8.0 kb and 6.4 kb; UMC43, *BamHI*, 9.7 kb, 7.3 kb and 5.7 kb; UMC40, *BamHI*, 7.2 kb, 4.7 kb and 4.3 kb; BNL7.71, *HindIII*, 10.6 kb; BNL5.71, *BamHI*, 11.3 kb, 6.8 kb and 5.7

kb; tda62, *Bam*HI, 6.5 kb and 5.5 kb; UMC68, *Hind*III, 6.0 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; phi10017, *Bam*HI, 15.1 kb and 9.5 kb; tda50, *Bam*HI, 8.5 kb; np1373, *Hind*III, 6.5 kb, 5.6 kb, 5.1 kb and 3.0 kb; tda204, *Bam*HI, 4.0 kb; np1393, *Eco*RI, 12.1 kb, 8.5 kb, 7.0 kb and 5.6 kb; UMC65, *Hind*III, 2.9 kb; UMC46, *Eco*RI, 6.5 kb and 5.6 kb; asg7, *Hind*III, 6.3 kb; UMC28, *Hind*III, 15.8 kb and 11.9 kb; UMC28, *Bam*HI, 9.9 kb, 7.6 kb and 6.6 kb; UMC134, *Hind*III, 7.5 kb and 4.7 kb; asg8, *Hind*III, 10.8 kb, 8.7 kb and 8.4 kb; phi20581, *Hind*III, 4.2 kb; O2, *Eco*RI, 9.4 kb; asg34, *Hind*III, 4.5 kb; BNL15.40, *Hind*III, 5.8 kb; UMC116, *Eco*RI, 9.5 kb; UMC110, *Bam*HI, 10.6 kb, 4.9 kb and 3.9 kb; BNL8.32, *Hind*III, 8.9 kb, 7.4 kb and 7.1 kb; BNL14.07, *Eco*RI, 6.4 kb; UMC80, *Hind*III, 10.7 kb, 8.2 kb and 2.4 kb; BNL16.06, *Eco*RI, 6.8 kb and 1.9 kb; BNL16.06, *Hind*III, 5.7 kb, 3.0 kb and 1.6 kb; phi20020, *Hind*III, 7.8 kb, 6.6 kb and 5.1 kb; np114, *Hind*III, 10.0 kb, 8.8 kb and 6.3 kb; BNL9.11, *Hind*III, 3.4 kb; UMC103, *Hind*III, 6.9 kb; UMC124, *Hind*III, 8.0 and 7.0; UMC124, *Bam*HI, 6.6 kb, 2.6 kb and 1.6 kb; UMC120, *Hind*III, 3.2 kb, 2.3 kb and 1.4 kb; UMC89, *Eco*RI, 7.3 kb; UMC89, *Hind*III, 7.3 kb; UMC89, *Bam*HI, 9.5 kb, 6.0 kb, 5.2 kb and 4.5 kb; UMC89, *Msp*I, 6.7 kb and 5.8 kb; BNL12.30, *Eco*RI, 3.5 kb; UMC48, *Hind*III, 6.2 kb, 5.3 kb, 4.7 kb, 4.2 kb and 3.5 kb; UMC53, *Eco*RI, 3.8 kb and 3.0 kb; UMC53, *Eco*RV, 8.4 kb; np1268, *Bam*HI, 6.4 kb; UMC7, *Bam*HI, 4.2 kb; UMC3, *Eco*RI, 3.5 kb and 2.0 kb; phi0005, *Eco*RI, 15.0 kb and 1.6 kb; UMC113,

EcoRI, 5.9 kb and 5.4 kb; UMC113, *BamHI*, 12.8 kb, 11.8 kb and 10.5 kb; UMC192, *HindIII*, 11.4 kb and 6.4 kb; wx (waxy), *HindIII*, 21.0 kb; UMC105, *EcoRI*, 3.9 kb; CSU147, *HindIII* 5.9 kb; BNL5.10, *HindIII*, 6.1 kb and 4.4 kb; UMC114, *BamHI*, 12.6 kb, 11.5 kb, 10.0 kb, 8.8 kb, 7.5 kb and 6.5 kb; UMC95, *EcoRI*, 5.6 kb; UMC95, *HindIII*, 7.7 kb, 7.3 kb, 4.8 kb, 4.5 kb, 4.1 kb and 1.7 kb; UMC95, *BamHI*, 15.0 kb and 9.0 kb; asg44, *EcoRI*, 5.3 kb; CSU61, *EcoRI*, 8.1 kb and 4.8 kb; BNL7.57, *BamHI*, 11.6 kb and 5.9 kb; CSU54, *EcoRI*, 14.7 kb and 12.6 kb; phi20075, *EcoRI*, 7.1 kb; np1285, *EcoRI*, 12.4 kb, 9.4 kb and 6.0 kb; KSU5, *EcoRI*, 9.8 kb, 7.6 kb, 6.1 kb, 3.8 kb and 3.5 kb; UMC130, *EcoRI*, 13.5 kb and 7.0 kb; UMC130, *HindIII*, 4.8 kb and 3.2 kb; UMC130, *BamHI*, 3.2 kb; UMC64, *HindIII*, 3.3 kb; UMC152, *HindIII*, 12.4 kb, 7.1 kb and 5.6 kb; phi06005, *EcoRI*, 12.8 kb; UMC163, *HindIII*, 7.0 kb, 4.8 kb, 3.0 kb, 2.6 kb and 2.3 kb; UMC44, *HindIII*, 9.8 kb, 8.7 kb, 7.2 kb, 5.5 kb and 4.0 kb; BNL10.13, *HindIII*, 10.8 kb; np1306, *HindIII*, 7.0 kb; pmt1, *HindIII*, 2.3 kb; pmt2, *HindIII*, 2.8 kb and 2.1 kb; pmt5, *HindIII*, 12.3 kb, 8.1 kb, 3.6 kb, 3.2 kb and 2.5 kb; tda48, *HindIII*, 8.2 kb; tda53, *HindIII*, 3.8 kb and 2.2 kb; tda168, *EcoRI*, 3.6 kb; tda16, *HindIII*, 4.3 kb; and tda17, *HindIII*, 7.0 kb; tda250, *BamHI*, 4.0 kb, recited as marker-enzyme fragment size;

wherein said maize plant is produced by:

(a) cross pollinating either a (*Tripsacum* X teosinte) female plant or a (teosinte X *Tripsacum*) female plant with a maize male plant to produce a trigeneric hybrid plant;

(b) backcrossing said trigeneric hybrid plant produced in step (a) at least once to a maize plant.

54. (Rejected) A seed, pollen, all derivatives, subsequent generations, variants, mutants, modifications, and cellular components produced by the plant of claim 53.

55. (Rejected) A maize plant according to claim 53 whereby the roots of said plant contain aerenchyma.

56. (Rejected) A maize plant according to claim 53 whereby said plant is drought tolerant.

57. (Rejected) A maize plant according to claim 53 whereby said plant is tolerant to corn rootworm.

58. (Rejected) A maize plant according to claim 53 further comprising a novel band identified by SSR probe phil23.

59. (Rejected) A maize plant according to claim 53 further comprising a novel band identified by SSR probe bn1g2235.

60. (Rejected) A maize plant according to claim 53 further comprising a novel band identified by SSR probe dupSSR23.

61. (Rejected) A maize plant according to claim 53 further comprising a novel band identified by SSR probe bnIg1805.

62. (Rejected) A maize plant comprising one or more restriction fragments selected from the group consisting of

BNL5.62, *Eco*RI, 10.3 kb; npi97, *Hind*III, 3.9 kb; UMC157, *Eco*RI, 6.5 kb and 3.3 kb; UMC157, *Hind*III, 5.5 kb; UMC157, *Bam*HI, 14.0 kb, 8.5 kb and 4.5 kb; UMC11, *Bam*HI, 7.0 kb; CSU3, *Bam*HI, 10.0 kb and 7.6 kb; UMC67, *Eco*RI, 19.2 kb; UMC67, *Bam*HI 13.4 kb, 11.0 kb and 1.6 kb; CSU92, *Bam*HI, 13.3 kb and 7.5 kb; asg62, *Bam*HI, 12.7 kb, 9.7 kb and 6.6 kb; UMC58, *Hind*III, 3.3 kb; CSU164, *Eco*RI, 9.0 kb and 7.0 kb; UMC128, *Hind*III, 6.0 kb; UMC107, *Eco*RI, 7.5.0 kb,

6.3 kb and 6.1 kb; UMC140, *EcoRI*, 4.9 kb; UMC140, *HindIII*, 6.5 kb; *adhI*,
HindIII, 9.4 kb; *adhI*, *BamHI*, 9.4 kb; UMC161, *HindIII*, 3.3 kb; BNL8.29,
HindIII, 9.3 kb and 8.3 kb; UMC53, *EcoRI*, 9.4 kb; UMC53, *EcoRV*, 8.4 kb, 3.8
kb and 3.0 kb; UMC6, *EcoRI*, 3.8 kb; UMC6, *HindIII* 9.4 kb; UMC6, *BamHI*, 13.2
kb, 12.7 kb and 7.0 kb; UMC61, *HindIII*, 3.4 and 2.8 kb *agrr167*, *BamHI*, 5.7 kb,
4.5 kb and 4.0 kb; UMC34, *EcoRI*, 7.5 kb and 5.4 kb; UMC34, *HindIII*, 8.8 kb, 6.5
kb and 5.8 kb; UMC34, *BamHI*, 9.4 kb; UMC135, *HindIII*, 11.6 kb and 10.8 kb;
UMC131, *EcoRI*, 10.6 kb, 5.8 kb and 4.3 kb; UMC55, *EcoRI*, 3.9 kb; UMC55,
HindIII, 4.3 kb; UMC5, *EcoRI*, 5.4 kb; UMC5, *HindIII*, 6.5 kb; UMC49, *BamHI*,
8.2 kb; UMC36, *BamHI*, 4.2 kb; UMC32, *EcoRI*, 5.3 kb; UMC32, *HindIII* 6.7 kb,
6.0 kb and 2.8 kb; *asg24*, *HindIII*, 7.2 kb and 6.4 kb; UMC121, *EcoRI*, 3.7 kb and
3.2 kb; BNL8.35, *HindIII*, 9.9 kb and 8.7 kb; UMC50, *BamHI*, 7.8 kb, 6.8 kb, 5.8
kb and 3.8 kb; UMC42, *HindIII*, 10.4 kb, 9.2 kb, 8.9 kb, 7.9 kb, 7.6 kb and 3.7 kb;
npi247, *EcoRI*, 8.0 kb; *npi247*, *HindIII* 3.0 kb; UMC10, *HindIII*, 3.0 kb; UMC10,
EcoRI, 6.5 kb and 5.5 kb; UMC102, *EcoRI*, 2.7 kb; BNL6.06, *EcoRI*, 6.8 kb;
CSU240, *EcoRI*, 10.6 kb, 4.5 kb and 3.3 kb; BNL5.37, *HindIII*, 10.3 kb, 5.8 kb and
3.5 kb; *npi296*, *EcoRI*, 7.9 kb; UMC3, *EcoRI* 2.5 kb and 2.0 kb; *npi212*, *HindIII*,
4.3 kb; *npi212*, *BamHI*, 5.4 kb; UMC39, *EcoRI*, 12.2 kb, 9.2 kb, 7.8 kb and 7.1 kb;
phi10080, *BamHI*, 9.7 kb; UMC63, *HindIII*, 9.5 kb and 4.3 kb; CSU303, *EcoRI*,
10.0 kb; UMC96, *HindIII*, 11.8 kb, 6.4 kb and 5.5 kb; UMC96, *BamHI*, 7.5 kb;

UMC2, *EcoRI*, 11.8 kb, 10.4 kb, 8.0 kb and 3.9 kb; CSU25, *HindIII*, 5.2 kb, 4.5 kb and 4.2 kb; agr115, *EcoRI*, 8.0 kb and 5.4 kb; agr115, *BamHI*, 5.4 kb and 3.5 kb; phi20725, *EcoRI*, 10.3 kb, 9.7 kb and 7.2 kb; phi20725, *HindIII*, 1.5 kb; UMC31, *EcoRI*, 5.8 kb and 2.0 kb; UMC31, *BamHI* 6.5 kb; UMC55, *EcoRI*, 3.9 kb; UMC55, *HindIII*, 4.3 kb; CSU235, *HindIII*, 6.8 kb and 3.0 kb; CSU585, *HindIII*, 8.3 kb and 6.1 kb; BNL5.46, *HindIII*, 13.7 kb, 10.5 kb, 9.7 kb and 5.1 kb; agr321, *BamHI*, 5.5 kb; agr89, *HindIII*, 7.1 kb; np1386, *HindIII*, 12.6 kb, 9.3 kb and 8.2 kb; UMC42, *HindIII*, 19.2 kb, 10.3 kb 8.9 kb, 7.6 kb, 3.7 kb and 3.0 kb; tda62, *BamHI*, 5.5 kb, 5.2 kb, 4.8 kb and 4.2 kb; BNL5.71, *EcoRV* , 11.3 kb, 6.8 kb and 5.7 kb; UMC156, *HindIII*, 3.0 kb; UMC66, *EcoRI*, 10.5 kb; UMC66, *BamHI*, 3.7 kb and 2.4 kb; UMC19, *BamHI*, 12.3 kb; UMC104, *HindIII*, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *BamHI*, 9.4 kb; UMC133, *HindIII*, 10.6 kb, 9.9 kb, 9.2 kb and 7.7 kb; UMC52, *BamHI*, 8.7 kb, 6.9 kb, 3.8 kb, 3.0 kb and 2.0 kb; BNL15.07, *HindIII*, 2.9 kb and 2.7 kb; np1409, *EcoRI*, 9.4 kb; np1409, *HindIII*, 10.4 kb, 9.0 kb and 3.9 kb; UMC147, *HindIII*, 16.3 kb, 3.8 kb and 2.4 kb; asg73, *EcoRI*, 3.8 kb; UMC90, *HindIII*, 7.7 kb, 6.5 kb, 2.8 kb and 1.6 kb; UMC90, *BamHI*, 9.0 kb; UMC72, *EcoRI*, 8.5 kb; UMC27, *HindIII*, 8.3 kb and 4.5 kb; UMC27, *BamHI*, 6.5 kb; UMC43, *BamHI*, 9.7 kb, 7.3 kb and 5.7 kb; tda37, *BamHI*, 9.0 kb, 8.0 kb and 6.4 kb; UMC43, *BamHI*, 9.7 kb, 7.3 kb and 5.7 kb; UMC40, *BamHI*, 7.2 kb, 4.7 kb and 4.3 kb; BNL7.71, *HindIII*, 10.6 kb; BNL5.71, *BamHI*, 11.3 kb, 6.8 kb and 5.7

kb; tda62, *Bam*HI, 6.5 kb and 5.5 kb; UMC68, *Hind*III, 6.0 kb; UMC104, *Hind*III, 12.4 kb, 11.6 kb and 7.5 kb; UMC104, *Bam*HI, 9.4 kb; phi10017, *Bam*HI, 15.1 kb and 9.5 kb; tda50, *Bam*HI, 8.5 kb; np1373, *Hind*III, 6.5 kb, 5.6 kb, 5.1 kb and 3.0 kb; tda204, *Bam*HI, 4.0 kb; np1393, *Eco*RI, 12.1 kb, 8.5 kb, 7.0 kb and 5.6 kb; UMC65, *Hind*III, 2.9 kb; UMC46, *Eco*RI, 6.5 kb and 5.6 kb; asg7, *Hind*III, 6.3 kb; UMC28, *Hind*III, 15.8 kb and 11.9 kb; UMC28, *Bam*HI, 9.9 kb, 7.6 kb and 6.6 kb; UMC134, *Hind*III, 7.5 kb and 4.7 kb; asg8, *Hind*III, 10.8 kb, 8.7 kb and 8.4 kb; phi20581, *Hind*III, 4.2 kb; O2, *Eco*RI, 9.4 kb; asg34, *Hind*III, 4.5 kb; BNL15.40, *Hind*III, 5.8 kb; UMC116, *Eco*RI, 9.5 kb; UMC110, *Bam*HI, 10.6 kb, 4.9 kb and 3.9 kb; BNL8.32, *Hind*III, 8.9 kb, 7.4 kb and 7.1 kb; BNL14.07, *Eco*RI, 6.4 kb; UMC80, *Hind*III, 10.7 kb, 8.2 kb and 2.4 kb; BNL16.06, *Eco*RI, 6.8 kb and 1.9 kb; BNL16.06, *Hind*III, 5.7 kb, 3.0 kb and 1.6 kb; phi20020, *Hind*III, 7.8 kb, 6.6 kb and 5.1 kb; np114, *Hind*III, 10.0 kb, 8.8 kb and 6.3 kb; BNL9.11, *Hind*III, 3.4 kb; UMC103, *Hind*III, 6.9 kb; UMC124, *Hind*III, 8.0 and 7.0; UMC124, *Bam*HI, 6.6 kb, 2.6 kb and 1.6 kb; UMC120, *Hind*III, 3.2 kb, 2.3 kb and 1.4 kb; UMC89, *Eco*RI, 7.3 kb; UMC89, *Hind*III, 7.3 kb; UMC89, *Bam*HI, 9.5 kb, 6.0 kb, 5.2 kb and 4.5 kb; UMC89, *Msp*I, 6.7 kb and 5.8 kb; BNL12.30, *Eco*RI, 3.5 kb; UMC48, *Hind*III, 6.2 kb, 5.3 kb, 4.7 kb, 4.2 kb and 3.5 kb; UMC53, *Eco*RI, 3.8 kb and 3.0 kb; UMC53, *Eco*RV, 8.4 kb; np1268, *Bam*HI, 6.4 kb; UMC7, *Bam*HI, 4.2 kb; UMC3, *Eco*RI, 3.5 kb and 2.0 kb; phi10005, *Eco*RI, 15.0 kb and 1.6 kb; UMC113,

EcoRI, 5.9 kb and 5.4 kb; UMC113, *BamHI*, 12.8 kb, 11.8 kb and 10.5 kb; UMC192, *HindIII*, 11.4 kb and 6.4 kb; wx (waxy), *HindIII*, 21.0 kb; UMC105, *EcoRI*, 3.9 kb; CSU147, *HindIII* 5.9 kb; BNL5.10, *HindIII*, 6.1 kb and 4.4 kb; UMC114, *BamHI*, 12.6 kb, 11.5 kb, 10.0 kb, 8.8 kb, 7.5 kb and 6.5 kb; UMC95, *EcoRI*, 5.6 kb; UMC95, *HindIII*, 7.7 kb, 7.3 kb, 4.8 kb, 4.5 kb, 4.1 kb and 1.7 kb; UMC95, *BamHI*, 15.0 kb and 9.0 kb; asg44, *EcoRI*, 5.3 kb; CSU61, *EcoRI*, 8.1 kb and 4.8 kb; BNL7.57, *BamHI*, 11.6 kb and 5.9 kb; CSU54, *EcoRI*, 14.7 kb and 12.6 kb; phi20075, *EcoRI*, 7.1 kb; np1285, *EcoRI*, 12.4 kb, 9.4 kb and 6.0 kb; KSU5, *EcoRI*, 9.8 kb, 7.6 kb, 6.1 kb, 3.8 kb and 3.5 kb; UMC130, *EcoRI*, 13.5 kb and 7.0 kb; UMC130, *HindIII*, 4.8 kb and 3.2 kb; UMC130, *BamHI*, 3.2 kb; UMC64, *HindIII*, 3.3 kb; UMC152, *HindIII*, 12.4 kb, 7.1 kb and 5.6 kb; phi06005, *EcoRI*, 12.8 kb; UMC163, *HindIII*, 7.0 kb, 4.8 kb, 3.0 kb, 2.6 kb and 2.3 kb; UMC44, *HindIII*, 9.8 kb, 8.7 kb, 7.2 kb, 5.5 kb and 4.0 kb; BNL10.13, *HindIII*, 10.8 kb; np1306, *HindIII*, 7.0 kb; pmt1, *HindIII*, 2.3 kb; pmt2, *HindIII*, 2.8 kb and 2.1 kb; pmt5, *HindIII*, 12.3 kb, 8.1 kb, 3.6 kb, 3.2 kb and 2.5 kb; tda48, *HindIII*, 8.2 kb; tda53, *HindIII*, 3.8 kb and 2.2 kb; tda168, *EcoRI*, 3.6 kb; tda16, *HindIII*, 4.3 kb; and tda17, *HindIII*, 7.0 kb; tda250, *BamHI*, 4.0 kb, recited as marker-enzyme fragment size;

wherein said plant is produced by:

(a) cross pollinating a maize female plant with either a (*Tripsacum* X teosinte) male plant or a (teosinte X *Tripsacum*) male plant to produce a hybrid maize plant;

(b) backcrossing said hybrid maize plant produced in step (a) at least once to a (*Tripsacum* X teosinte) plant or a (teosinte X *Tripsacum*).

63. (Rejected) A seed, pollen, all derivatives, subsequent generations, variants, mutants, modifications, and cellular components produced by the plant of claim 62.

64. (Rejected) A maize plant according to claim 62 whereby the roots of said plant contain aerenchyma.

65. (Rejected) A maize plant according to claim 62 whereby said plant is drought tolerant.

66. (Rejected) A maize plant according to claim 62 whereby said plant is tolerant to corn rootworm.

67. (Rejected) A maize plant according to claim 62 further comprising a novel band identified by SSR probe phi 123.

68. (Rejected) A maize plant according to claim 62 further comprising a novel band identified by SSR probe bn1g2235.

69. (Rejected) A maize plant according to claim 62 further comprising a novel band identified by SSR probe dupSSR23.

70. (Rejected) A maize plant according to claim 62 further comprising a novel band identified by SSR probe bnIg1805.

71.-79. (Canceled)

b. Claim Support

Support for Claim 23 is located at least on p. 1; pp. 12-14; the paragraph bridging pp. 18-19; the first full paragraph on p. 23; the first two full paragraphs on p. 29; Tables 1-5; and original Claims 1 and 7; in *id.*

Support for independent Claims 44 and 53 is located in the second full paragraph on p. 7; the paragraph on pp. 12-13; the paragraph bridging pp. 13-14;

the first full paragraph on p. 14; the paragraph bridging pp. 31-32; Tables 1-5; and original Claims 2, 4, 8 and 10; in *id.*

Support for independent Claim 62 is located in the second full paragraph on p. 7; the paragraph on pp. 12-13; the paragraph bridging pp. 13-14; the first full paragraph on p. 14; the paragraph on pp. 22-23; the paragraph bridging pp. 31-32; Tables 1-5; and original Claims 2, 4, 8 and 10; in *id.*

Support for dependent Claims 45, 54 and 63 is located on pp. 12-14; and original Claims 3 and 9-12; in *id.*

Support for dependent Claims 46, 55 and 64 is located in the abstract; p. 1; the third full paragraph on p. 7; the first full paragraph on p. 14; the first full paragraph on p. 24; the paragraph bridging pp. 26-27; the paragraph bridging pp. 27-28; the first full paragraph on p. 28; and the paragraph bridging pp. 29-30; in *id.*

Support for dependent Claims 47, 56 and 65 is located in the third full paragraph on p. 7; the paragraph bridging pp. 27-28; and the first full paragraph on p. 29; in *id.*

Support for dependent Claims 48, 57 and 66 is located in the third full paragraph on p. 7; the paragraph bridging pp. 24-25; the paragraph bridging pp. 25-26; and the first and third full paragraphs on p. 29; in *id.*

Support for dependent Claims 49, 58 and 67 is located in the paragraph bridging pp. 25-26; the third full paragraph on p. 29; and in Table 5; in *id.*

Support for dependent Claims 50, 59 and 68 is located in the paragraph bridging pp. 25-26; the paragraph bridging pp. 28-29; the third full paragraph on p. 29; and in Table 5; in *id*.

Support for dependent Claims 51, 60 and 69 is located in the paragraph bridging pp. 25-26; the third full paragraph on p. 29; and in Table 5; in *id*

Support for dependent Claims 52, 61 and 70 is located in is located in the paragraph bridging pp. 29-30; and in Table 5; in *id*.

c. Means/Step Plus Function Analysis

None.

d. Evidence

None.

e. Related Cases

None.

Respectfully submitted,

Mary W. Eubanks

In re US Patent Application No. 10/614,255
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